

suggests, expediency seems to be the sole argument in favor of the oral method.

We have learned much by these methods, but we still have much to learn about cholecystitis. Most of the gall bladders examined by the pathologist will have some pathological change justifying our report of pathological gall bladder. We will be guided in our reports more and more by the effects experienced by the patients several years after the removal of what we term pathological gall bladders.

RHEUMATIC HEART DISEASE—FACTORS IN ITS PROGNOSIS*

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DISCUSSION by Harold K. Faber, M. D., San Francisco;
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I HAVE chosen the subject of prognosis in the rheumatic heart disorders of childhood, not because I consider myself an authority, but rather in order to point out the inadequacy of our common knowledge, and to suggest possible ways in which we may gain a greater insight into this perplexing problem.

INTRODUCTORY

In his lectures to the postgraduate students at the London Hospital, Sir James Mackenzie once remarked, "In your practice one question will arise incessantly and insistently implied or demanded of you by every patient, and that question is, 'What is to be the outcome of my complaint?' This question will meet you in most unexpected ways. Your diagnosis may be brilliant and yield you great satisfaction and the applause of your colleagues, but your patient will only be interested in it so far as it throws light upon his own future, and the problems thus presented are infinite."

No one can practice long without a forceful realization of the truth of this statement. Moreover if one has formed the habit of seeing things through the patient's eyes the reasonableness of the demand is obvious. Therefore most of us must find ourselves in agreement with Sir James Mackenzie when he says that "Prognosis is the coping stone which should complete the edifice of a medical education." But when and how is this last coping stone to be added to our educational edifice?

I venture to state that not one of us, while in medical school, ever received any clear-cut instruction on the prognostic significance of each abnormal symptom or sign in the cardiac disorders of childhood. And yet we are constantly confronted with young patients who present unusual irregularities, rate disturbances or murmurs. How can we predict the future wisely unless we do have some definite instruction in regard to the probable significance of such evidences of cardiac disorder?

When the physician is puzzled by unusual symptoms or signs he usually turns to some reference book—Osler, the loose-leaf systems, or a favorite textbook. There much knowledge may

be gained concerning the probable diagnosis and perhaps many useful, as well as useless, directions as to treatment. But alas, one looks in vain for definite advice which will enable one to give the patient a reliable prognosis. True it is considered the proper thing to insert a paragraph on this subject. But there are presented only vague generalities or else statistics on mortality or morbidly records in so many hundred cases with a given diagnosis. Such information does not help the physician to determine the probable outcome for his own particular patient nor to estimate the significance of individual subjective and objective phenomena.

We must confess, then, that there is great need for more data on the prognostic significance of all the various evidences of disturbed cardiac function. Furthermore there can be only one reliable method of obtaining the necessary information, and that is by the accurate observation of each patient from the onset of symptoms throughout the rest of the patient's life. There are few such observations available in the whole medical literature of the world and yet they would furnish us with invaluable information concerning prognosis. Nor should we forget that the practitioner is the man upon whom this burden must fall. He alone has the opportunity for the collection of these data, so necessary for the rounding out of our medical education.

The solution of this problem demands not only patient persistence and much time—a lifetime in fact—but also a thorough understanding of the closely allied subjects of diagnosis and treatment. Moreover in the very act of gaining a keener insight into prognosis one obtains information which is of great value in the diagnosis and treatment of the patient. This added knowledge may, in turn, enable the physician to alter the prognosis most favorably. I shall, then, consider briefly a few aspects of these subjects which seem to have a direct bearing on the prognosis.

DIAGNOSIS AS IT CONCERNS PROGNOSIS

It is not my purpose to attempt an evaluation of each symptom and sign of cardiac disturbance as to its prognostic significance. But I wish to call to your attention certain essential facts which we must bear in mind if we are to make any valuable contribution to the subject of "prognosis."

To say that we find positive signs of heart disease—or any other disease—usually means that the disease has advanced to the point of actual damage to the organ involved. Naturally the ideal toward which we strive is the prevention of disease or at least its arrest before any permanent damage has occurred. When I say that early diagnosis is of the utmost importance not only in the treatment but in the resulting prognosis I refer to a diagnosis which has been made before the heart is seriously damaged. For instance, we know that rheumatic arthritis, chorea, and such foci of infection as are represented by chronic tonsillitis or sinusitis, are the most frequent forerunners of carditis. Moreover its tendency to occur in several members of the same family suggests another causative factor. Therefore we must

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be constantly on our guard not simply to watch for the earliest evidence of heart involvement, either subjectively or objectively, but also to prevent recurrent infections of the type which experience has taught us are most apt to result in ultimate cardiac damage. The point I should like to stress is that adequate prophylaxis combined with early diagnosis makes the prognosis in general more favorable. Only by such careful observation can we determine the significance of each individual symptom or sign.

Although a discussion of functional heart disorders is not within the scope of this paper, it is well to remember the need for familiarity with the many disturbances in rate, rhythm and sounds which are to be found in the heart of the growing child from birth to puberty. It is only by a clear-cut differentiation between such disorders, whether physiological or due to disturbances outside the heart itself, and those due to early organic heart disease, that one can hope to create a more favorable prognosis for the rheumatic heart. Without such knowledge one may either fail to institute early treatment for a patient with real cardiac involvement or else order a needless and perhaps harmful curtailment of activity for a child who needs plenty of outdoor exercise as part of the cure for his functional heart disorder.

Let us suppose, however, that cardiac damage is already present when the patient is first brought to the physician's office. He must then ask himself two questions: "How can I determine the patient's chances for complete or partial recovery and what measures can be adopted which will improve those chances?" Only the first of these questions, involving problems of diagnosis, concerns us for the moment; the other question we shall consider under the discussion of the relationship of treatment to prognosis.

In order to answer this first question one must consider not only the prognostic significance of variations in rate, rhythm, sounds, size and cardiogram findings or pulse tracings, but also the part played by previous infections, whether obviously rheumatic or not, as well as the importance of evidences of rheumatic infection in other parts of the body. Thus the occurrence of repeated rheumatic infections in the past suggests both that the patient has been unable to get rid of the etiologic agent and also that the probable extent of the damage already done is great—two factors which make the prognosis less favorable. Further, the coexistence of other cases in the same family suggests that the disease is infectious and that there may be a constitutional or familial susceptibility to rheumatic infections. Here again the effect of such findings upon the prognosis is distinctly unfavorable. The importance of careful history taking and of thorough-going examinations becomes obvious as one considers how many factors may enter into the formation of a reliable prognosis.

The clearly defined rheumatic infections are acute rheumatic arthritis, an associated rheumatic carditis, and the less clearly proven chorea. In addition to these there are a great many vague

complaints which are often, though probably incorrectly, classed as rheumatic. I refer to fleeting muscle and joint pains without swelling or redness, so-called "growing pains," sore throats, tonsillitis, and sinusitis. It seems probable that the nose, the throat and the accessory sinuses may be the seat of an infection due to the causative agent of rheumatic fever. Whether this is true or not, we know that such foci of infection tend to lower not only the resistance of the local tissues to invading organisms but also the general resistance of the body as a whole. Muscle and joint pains frequently disappear with the removal of such foci. Their relationship to certain infections of the genito-urinary and gastro-intestinal systems has been ably demonstrated at many clinics, notably at St. Louis. Therefore the importance of foci of infection so far as they affect the prognosis of rheumatic heart disease lies not so much in determining their exact relationship—interesting as that may be—but rather in the recognition that the presence of any such focus must make recurrent infection more likely and hence the prognosis more grave. To attempt either proof or disproof of this statement by the quotation of statistics on children with tonsillectomy as compared to those without, is a futile procedure, since the tonsils may or may not represent the seat of the infective focus. Moreover we are apt to forget that the removal of the tonsils after the rheumatic infection has gained an entrance to some other part of the body may be as futile as locking the barn door after the horse is stolen. Removal of foci of infection should be accomplished before the disease has gained a foothold elsewhere in the body.

After estimating the significance of these etiological factors, making a mental note of possible measures of combating them, we must turn our attention to the physical signs. Here the essential point to be determined in any attempt at prognosticating the future, is the extent to which the heart is already damaged. Is there pericardial involvement at present as shown by friction rub or effusion? Has some previous pericarditis left adhesions which seriously handicap the heart in its action? How extensively are the valve cusps damaged? Has a mitral stenosis been produced as shown by presystolic or diastolic murmurs or is there a simple regurgitation? Is more than one valve affected? It is obvious in what way our answers to such questions must alter the prognosis. Passing on to a consideration of the myocardium one must attempt some conclusion as to the evidences for or against damage to the heart muscle. Few rheumatic hearts escape some myocardial involvement, and the degree of harm done in such involvement is not easy to estimate. Clinically, of course, the reaction of the heart itself, whether compensated or decompensated, together with the rate and rhythm may give some information as to the condition of the muscle. The electrocardiograph record may give us valuable aid in recognizing such disorders as damage to the conducting mechanism or to some localized part of the heart muscle. So too the x-ray may be of

use in correcting the errors in percussion of the heart borders or in bringing to light unsuspected abnormalities in the size or shape of the heart.

The importance of evidences of rheumatic infection elsewhere in the body must be carefully weighed. Thus the severity and persistence of joint involvement, chorea, or the characteristic subcutaneous rheumatic nodules, must always enter into the consideration of a carefully formed prognosis. The fibroid nodules, so characteristic of the disease, may serve as a good illustration of the need for careful observation of signs before giving a final estimate of their prognostic value. The English workers were the first to point out their relationship to rheumatic fever. At this time it was stated by certain American workers that these nodules must be more common in England than in America. Soon, however, various workers in this country began to report their appearance in the most severe cases of rheumatic fever. The conclusion was at once drawn that they must be taken as being of serious prognostic significance. Following recent careful and painstaking observations, their occurrence seems to be more frequent than was formerly supposed. They are, then, to be looked on as simply one of the possible manifestations of the disease. And just as repeated evidences of rheumatic infection elsewhere in the body are of serious import so recurrent crops of rheumatic nodules indicate a poor prognosis.

We have already stressed the importance of a thorough history and examination. If we are to give a sound prognosis we must constantly bear in mind the factors which seem to exert the greatest influence on the final outcome. We may say, in the first place, that the prognosis is made graver by the occurrence of rheumatic infections in other members of the family, giving a greater danger of reinfection as well as indicating the possibility of a familial tendency or susceptibility to the disease. Secondly, the presence of any unremoved foci of infection in the patient is to be regarded as a distinct menace to a good prognosis. Thirdly, each recurring attack of rheumatic fever, especially of rheumatic carditis, lessens the patient's chances to a marked degree. And in the fourth place, any signs pointing to cardiac damage increase the gravity of the prognosis in proportion to the degree and type of the damage. Thus evidences of a mitral stenosis are of more serious import than a simple regurgitation. Similarly heart block or other evidences of myocardial damage suggest a permanent impairment of the efficiency of the heart muscle. In short those signs which suggest cardiac decompensation either as an immediate or as a late result must always be associated with a poor prognosis. Repeated decompensation in itself allows one to give only the gloomiest of outlooks.

At times one sees patients so acutely ill with rheumatic carditis that their immediate future seems dubious indeed. But if it is a first attack, and if their past history and general condition give nothing to suggest a poor prognosis, it is often astonishing to see how completely they recover. The late Doctor Holt in the last lectures

which he delivered in Peking, discussing the remarkable power of the organism of the growing child to repair severely damaged body tissues, cited several instances of complete recovery from rheumatic endocarditis in which there had seemed to be considerable cardiac damage at the time of the infection. This brings up the question of estimating the prognosis during the period of convalescence. Certainly those patients who show a steady and relatively rapid recovery may usually be given a much more favorable outlook for life, since they show such early evidence not only of less crippling damage to the heart but of good recuperative powers. This also suggests again that by one's therapeutic skill one may favorably affect the prognosis.

PROGNOSIS AS INFLUENCED BY TREATMENT

It may also be said that a thorough understanding of the prognostic significance of every point which is brought to light in the history and physical examination should, in the end, give us the only sound basis for rational therapy. In spite of our acknowledged lack of any adequate grasp of the whole subject I shall attempt to indicate briefly the chief therapeutic measures which seem to have a direct bearing on the prognosis.

First of all I must again stress the importance of the various preventive measures. Separation from other cases of rheumatic infection seems to be clearly indicated, and yet this is rarely done. The removal of every possible focus of infection—not simply the tonsils—is a most valuable and incidentally a much neglected weapon in combating the occurrence of rheumatic infection. And finally the general ordering of the patient's daily routine of life in order to avoid overfatigue, exposure to infections, strains, and chilling exposures, plays its part in the prophylaxis of the disease.

Let us now consider the child acutely ill with rheumatic carditis. We must all agree that absolute bed rest is the essential part of his treatment; but it is important to remember that the patient's future may depend upon the thoroughness with which this simple measure is carried out. Every motion from the act of eating to the mere shifting of the patient's position in bed should be reduced to the minimum expenditure of energy. The patient *must* have rest; and codein or morphin may be a most necessary adjunct to good nursing. The beneficial effects of such therapy may be lost unless it is continued until after the pulse and temperature have returned to their normal level.

Then comes a very critical period in the successful recovery from a rheumatic carditis. How long shall we advise rest in bed and upon what indications shall we depend in estimating the probable prognosis and in determining the speed with which the patient may be allowed to resume his normal activity?

Although I do not feel that this question is by any means solved, yet I do feel that a systematic application of physiotherapy during the stage of convalescence is of the greatest possible value. In 1922 the late Doctor Bronson presented before

this body a most admirable discussion of this subject. There is no question in my mind but that the prognosis may be greatly improved by some regimen which starts with the simplest kind of passive motions in bed and carries the patient along by a careful grading of the exercises until it is safe to allow him to assume the strain of his daily routine of life at home. Such exercises may usually be started about two weeks after the temperature and pulse have returned to normal. The tolerance of the patient to these motions is carefully determined by pulse records before and after each set of exercises, and by blood-pressure readings at least once a week. By this means also much valuable information may be obtained in regard to the prognosis. A rapid increase in the patient's tolerance to a given set of exercises gives evidence of less serious cardiac damage and hence of a more favorable prognosis. There can be little doubt of the danger involved in a period of long bed rest without any such exercises, followed by a sudden resumption of the normal daily activities. Many times it may be a matter of months before it is safe to allow a patient out of bed; but carefully controlled exercises in bed which never go beyond the individual's tolerance will not only shorten the necessary period in bed but will also greatly lessen the strain on the heart when the patient is first allowed up.

These graded exercises are important from quite another point of view, namely, that of keeping up the patient's morale. I am sure we have all seen patients whose failure to make a good fight for life seemed actually to play an essential part in the fatal outcome. The daily exercises give these youngsters some tangible evidence of progress—something to which they can look forward each day with renewed interest in life. Such obvious proof of progress is strikingly absent in the usual regimen of prolonged bed rest. Equally careful attention should be paid to the patient's morale during the whole follow-up period. Physiotherapy classes for some, and boys' and girls' clubs for others, will help materially in combating discouragement. In no other way can we obtain that adequate degree of cooperation, so essential to the preservation of a good prognosis for our cardiac patients.

I have said nothing so far about the question of drugs except to urge the use of opiates to obtain complete rest during an acute carditis. During recent years we have learned to use digitalis less frequently but in larger doses than formerly. Except in the presence of auricular fibrillation—a rare finding in childhood—the results from its use are apt to be disappointing. To be sure congestive heart failure is frequently much benefited by digitalization. A persistent tachycardia may also yield well to digitalis in proper dosage. But in the presence of an acute infection the results are usually so discouraging as to form almost a contraindication to its use. Therefore it may be fairly said that in childhood digitalis only occasionally alters the prognosis to any marked degree, and beneficial results can be obtained only by giving an adequate amount of the drug. Chil-

dren require 30 to 100 per cent larger doses than the average adult as calculated by the Hatcher-Eggleston formula. Thus for every ten pounds of body weight the average child will require .13 to .20 grams of the dried leaf or in terms of the tincture about 1.5 to 2.0 cc. per ten pounds of body weight, before actual digitalization can be expected. The total dose may be given over a period of time varying from twenty-four hours to a week, according to the type and severity of the given case. In other words, if digitalis is to affect the prognosis in a favorable way it must be given only to selected cases and in doses large enough to produce actual digitalis effect as shown by a slowing and strengthening of the heart beats. The early toxic symptoms of nausea and vomiting are to be avoided if possible and their development must serve as a warning of overdosage.

Even in these days, when modern scientific medicine denies that there is a specificity in the action of the salicylates, one can hardly pass them by without mention. For the joint pain associated with rheumatic fever yields so satisfactorily to large doses of this drug that their indirect effect on the heart through their quieting of the patient may have a marked influence on the ultimate prognosis. Hence lack of proof as to their specificity cannot justify failure to use them in relieving the pain of rheumatic arthritis. Whether the chance of recurrent rheumatic fever can be lessened by the use of salicylates intermittently throughout the year or during seasons when the patient is subject to attacks, is still an open question which lacks adequate proof on either side. The need for carefully controlled clinical experimentation along such lines is too obvious to need further stressing.

SUMMARY

There are, then, certain essential points at which treatment and prognosis are very closely associated. These may be summarized as follows: (1) The prevention of rheumatic heart disease by separation from possible contacts, by thorough removal of all foci of infection, and by careful treatment of any rheumatic infections as they occur. (2) Early diagnosis of cardiac involvement. (3) Close observation and treatment during an acute carditis. (4) Adequate after care and follow-up with frequent observations on the changing tolerance of each individual patient to graded exercises. I have listed these in such a way as to suggest how the prognosis may be improved by treatment. It must not be overlooked, however, that only by a thorough application of such therapeutic measures as we possess can we gain adequate data upon which to base our prognosis.

I should like to close with a plea for the widespread establishment of convalescent homes where cardiac children may receive proper care and where invaluable observations can be made on large groups of such children during the period when they need rest and quiet. Furthermore the tedious and exacting task of giving graded exercises necessitates rather more knowledge and skill than the average parent possesses. Our hospitals

are usually much too busy with acute cases to carry out any such regimen, and the price demanded by trained physiotherapists places their help quite beyond the reach of either the average family or the average hospital pediatric service. The pressing demand for more efficient care of our cardiac children, and the equally important need for greater knowledge concerning the disease, its cause, and its prognosis cannot be satisfactorily relieved until we have such convalescent homes for that particular portion of our youth who are suffering from heart disease. Nor can I think of any single measure which would accomplish more toward giving these children a brighter prognosis.

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DISCUSSION

HAROLD K. FABER, M.D. (Stanford University Hospital, San Francisco)—Doctor Washburn has given a thoughtful and thorough presentation of a subject of great practical importance. The prognosis of rheumatic infections in children is extraordinarily difficult to determine, but it is a thing which parents expect and demand of the physician. Doctor Washburn has shown the points on which the practitioner may base his prophecies. It is well I think in rheumatic cases to keep in the background of one's mind the marked differences between childhood and adult life, particularly the considerable powers possessed by the child to overcome or compensate for degrees of damage which would certainly cripple the adult for life. While it is not well at the onset of rheumatic infection to stress this possibility too heavily it does permit a certain guarded optimism with one's juvenile patients not quite so justifiable with those more advanced in years.

Doctor Washburn's comments on familial infection are of great interest. The whole question of constitutional predisposition is, however, so imperfectly established that it is perhaps better at present not to rely too heavily on its assumptions. *A priori*, contact infection rather than heredity is the more probable explanation of familial incidence, and the better guide to management. It seems to me reasonable to treat rheumatic infection as communicable and to institute suitable precautions against its spread. Proper institutional facilities for patients with actual or potential cardiac disease are essential. The convalescent home in the country, with provisions for full bed rest and trained nursing (as at the Stanford Convalescent Home), certainly offers the best solution. The prognosis, as Doctor Washburn says, depends to a great extent upon adequate rest, and this of course must often be continued for long periods of time. It is not uncommon to see some fever continue for months. The advantages of the country are to some degree intangible, but nevertheless real. The pure air, unobstructed sunshine, freedom from noise and dust plus, perhaps, some unknown factors, bring about a cheerfulness and contentment that, as Doctor Washburn rightly emphasizes, are of the greatest practical value to the patient and make a favorable outcome of his disease more probable.

Doctor Washburn's conservatism in discussing foci of infection is praiseworthy. The character of the relationship between foci and general infection or distant local infection cannot even today and in spite of the enthusiasm of the Rosenow school be regarded as clearly defined. The whole hypothesis will probably undergo radical revision before it is on a firm basis. In the case of rheumatic infection in which the focal infection theory has been held longer than in almost any other disease, conclusive proof is still lacking. It seems most reasonable at the present time to assume that the specific virus may enter the body at any one of several points and may find various lodging places during periods of activity and the intervals between. The best chance of prevention does not lie in the im-

possible attempt to remove every potential portal of entry before infection nor in the removal of every suspected portal after infection, but to prevent infection first by avoidance of contact, and second, by so improving and maintaining personal and environmental hygiene that the individual's chances of becoming infected are minimized. That the latter is the most effective method is shown by the relative infrequency of rheumatic infection in the economically better classes, in which good hygienic conditions are as a rule possible and actual.

While evidently diseased tonsils should as a rule be removed, purulent sinusitis suitably treated, and so on, it is necessary to recognize that surgical procedures in infected areas are not without danger. Most practitioners of experience have seen such post-operative complications of tonsillectomy as endocarditis, pericarditis, or even general sepsis—complications which the tonsillectomy was designed to avoid. Fortunately these are rare and do not constitute contraindications to the operation where it is manifestly required, but they point to the need of caution and foresight.

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DONALD CASS, M.D. (5300 Hollywood Boulevard, Los Angeles)—I have read Doctor Washburn's article with a great deal of pleasure. He has been unusually clear in covering his subject. My own thought is to add a word about prognosis after repeated attacks, and in later life after the acute damage has occurred. The importance of recurrent or repeated attacks is paramount and is the thing we have all worried over and tried to prevent by removing foci, by removing possible infected contacts, etc. I wish to mention the importance of *any* infection in a person who has myocardial damage. The tendency to dilation which occurs in pneumonia can be cited. This same type of intoxication can be said to be present in all general infectious diseases to a greater extent in some than in others. My own experience has been that attacks of gastro-intestinal infections, characterized by slight rise in temperature and diarrhea will in many instances affect the myocardium as strongly as an attack of streptococcus sore throat.

Both Doctor Washburn and Doctor Faber emphasized this in speaking of general hygiene, including removal of septic foci from the body to prevent any loss of resistance that their presence might cause. Exercise and convalescent home treatment is something that many of us are unable to obtain for our patients, but it is the ideal convalescence for this disease. One other means of treatment that I mention, only to condemn, is the use of various dyes intravenously. Many have used mercurochrome and gentian violet in the vein in treating patients during the active courses of rheumatic heart disease, but I have yet to see a patient benefited and I have seen some who apparently did not do so well after having this treatment.

Doctor Faber stated that a guarded optimism is justified. I am frankly optimistic about immediate results; and feel that when past the initial attack, prognosis can be optimistic in direct ratio to the intelligence of the cooperation of the patient and his associates in the promotion of hygiene to prevent recurrent rheumatic fever and other infections after the manner described in Doctor Washburn's paper.

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OSCAR REISS, M.D. (2007 Wilshire Boulevard, Los Angeles)—Doctor Washburn's paper is one quite worthy of thoughtful consideration and offers to the practitioner an excellent basis to guide him in the prognosis of rheumatic heart disease.

I can only emphasize certain of the points that he has already stressed.

1. *No prognosis should ever be offered until all available diagnostic measures have been used not only to assure a proper diagnosis, but also to establish as nearly as possible the extent of cardiac damage.* Altogether too frequently have we seen children with trivial heart conditions converted into invalids because

parents have been frightened by improper prognosis. Hasty prognoses often do as much harm as improper treatment.

2. *Importance of Outlining Comprehensive Treatment and Management of This Condition When First Seen*—All of us who are attending county hospitals frequently see our unfortunate little patients taken home so early that they return with a recurrence. This we see repeated until an irremediable amount of damage is done. The best interest of his patients demands that the physician not only be able to properly diagnose ailments and offer therapeutic remedies, but be able also to convince his patients of the dire importance of carrying out implicitly the measures for relief that he suggests.

3. *Prophylaxis*—One cannot help but be deeply impressed by the infrequent incidence of rheumatic infection in private practice among the better-to-do families. This is obvious proof of the importance of hygiene in the prevention of rheumatism.

MECHANICAL DIAGNOSES IN PULMONARY TUBERCULOSIS*

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DISCUSSION by George Dock, M. D., Pasadena; W. R. P. Clark, M. D., San Francisco; T. H. Toynbee Wight, M. D., Palo Alto.

"DO not stunt the natural faculties given you by placing too much dependence upon mechanical agencies," is a statement quoted to me as coming from a professor in one of our leading medical colleges. I am a firm believer in that doctrine.

THE SPHYGMOMANOMETER

My father, who was a physician also, discussing the value of the sphygmomanometer, said "Train your fingers to determine the blood pressure and you may find it to help you out of many tight places when mechanical devices are either not available, or fail you when available." He claimed he could, by use of his fingers, make an estimate of blood pressure sufficient for at least most clinical purposes. After checking him with the sphygmomanometer he made a convert of me. I fear too many of us are failing to train the tactile sense as my father did through years of practical experience.

I would not, however, have you think I am opposed to the use of the sphygmomanometer. In diseases of the lungs I believe blood pressure important enough not to trust to my imperfectly trained sense of touch, so I use this mechanical means and record the findings for future reference and comparisons.

I do not make a diagnosis of pulmonary tuberculosis by mechanical means only. I confess I use them, but depend more upon the use of those natural faculties given me by nature. And when machine and natural faculties fail to agree I place more dependence upon the latter. One of the truest statements ever made by John D. Murphy is, "Diagnoses are made with cortical cells rather than with alleged instruments of precision." This opinion I believe I confirmed during five years' work in Government service, where repeated ex-

periences taught me mechanical agencies are too frequently undependable.

THE X-RAY

Let us consider the x-ray. During the greater part of my Government work I had the assistance of a very competent roentgenologist. Yet, in spite of his acknowledged competency, through the use of my natural faculties developed by years of practical experience, the x-ray interpretations were too frequently found and proven to be wrong.

By x-ray I have seen lungs diagnosed as normal that were obviously diseased; and the reverse, diagnosed as diseased which were not. I have seen malignancy diagnosed as tuberculosis; tuberculosis diagnosed as pneumoconiosis; syphilis diagnosed as tuberculosis or pneumoconiosis. I have seen abscess diagnosed as tuberculosis and malignancy as abscess. Recently I saw a case of diaphragmatic hernia diagnosed as tuberculosis with cavitation, and more recently I saw a case of miliary tuberculosis diagnosed as postinfluenzal pneumonitis. A correct diagnosis of this case I made from the history alone which was confirmed by post-mortem findings.

Again I plead against possible misunderstanding, for I am as strong a believer in the use of the x-ray in the diagnosis of lung diseases as any of my hearers, and confess that on more than one occasion it has been of great help in reaching correct conclusions. I am one clinician who seems to recognize there are cases of lung disease which, at the time, give no definite physical signs. This is particularly true of miliary tuberculosis and pneumoconiosis, more especially when associated with an incomplete or otherwise defective history.

But let us not deceive ourselves about the x-ray. We must all admit the plates show nothing but certain shadows of more or less density. They may be flocculent, cottony, linear markings or what not, but the fact remains they are only shadows. I will say without fear of contradiction by any honest authority, similar shadows, similarly placed as to lobe involved, are caused by different diseases. But from the study of such plates there is no roentgenologist that ever has been or ever will be able to state without the possibility of error just what disease is responsible. One needs but to compare x-ray reports with post-mortem findings to be convinced of that fact.

Now let us take the microscope as another example of mechanical diagnoses. Like the x-ray it is too frequently a source of confusion and often of positive error, even though it is so often helpful. We should be more guarded in accepting reports from clinical laboratories which do not tally with the majority of the other means of arriving at a diagnosis.

THE MICROSCOPE

Too many are prone to take the short cut to diagnosis by means of the microscope. By all means use it, but we should not let this mechanical aid stunt our diagnostic ability. Our eyes, hands, ears and cortical cells are fully as dependable.

Let us consider the microscopic examination

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